REMARKS

Claims 1-9 stand rejected under 35 U.S.C. § 102 as being anticipated by Hasegawa et al.. This rejection is respectfully traversed for the following reasons.

A. CLAIM 1

Claim 1 recites in pertinent part, "forming a resist film of a chemically amplified resist material including a base polymer having a lactone group and having neither a hydroxyl group nor a carboxylic group, and ... irradiating said resist film with extreme UV of a wavelength of a 1 nm through 30 nm band for pattern exposure."

In contrast, Hasegawa et al. discloses a base polymer which has a chain hydrocarbon including a OH group or a COOH group, and moreover, Hasegawa et al. fails to expressly or inherently disclose that the base polymer has neither OH group nor COOH group. As is well known in patent prosecution, "inherency may not be established by probabilities or possibilities", *Scaltech Inc. v. Retec/Tetra*, 178 F.3d 1378 (Fed. Cir. 1999). Indeed, Hasegawa et al. discloses only a base polymer having a lactone group (see column 2, lines 6-16) and chain hydrocarbon including an OH group or a COOH group (see column 2, line 66 through column 3, line 46, and the formula (2a) at column 3), and a chemically amplified resist material having a compound capable of suppressing the rate of diffusion when the acid generates within the resist film (see column 26, lines 57-67).

Further, Hasegawa et al. discloses only irradiating the resist film with the UV of a wavelength of 193-248 nm, an excimer laser, x-rays, or an electron beam; and fails to disclose or suggest irradiating the resist film with the extreme UV of a wavelength of a 1 nm through 30 nm band as recited in claim 1. Indeed, Hasegawa et al. disclose only the resist film being irradiated with deep-UV rays having a wavelength of 193 to 248 nm, an excimer laser, x-rays, or an

electron beam (see column 35, lines 40-46). In particular, a wavelength of a KrF excimer laser is 248 nm, that of a ArF excimer laser is 193 nm, and that of the x-rays is not more than 0.1Å (0.01 nm).

As anticipation under 35 U.S.C. § 102 requires that each and every element of the claim be disclosed in a single prior art reference, *Akzo N.V. v. U.S. Int'l Trade Commission*, 808 F.2d 1471 (Fed. Cir. 1986), based on the forgoing, it is submitted that Hasegawa et al. does not anticipate claim 1, nor any claim dependent thereon.

Moreover, according to one aspect of the present invention as recited in claim 1, when the resist film is irradiated with the extreme UV of a wavelength of a 1 nm through 30 nm band for the pattern exposure, excitation of an OH group at the end of the base polymer can be avoided in the exposed portion of the resist film, and hence, radicals are minimally generated. Accordingly, since a crosslinking reaction is minimally caused within the base polymer and between polymers, the exposed portion of the resist film can be definitely dissolved in an alkaline developer. As a result, the resist pattern can be formed in a good pattern shape.

B. CLAIM 6

Claim 6 recites in pertinent part, "forming a resist film of a chemically amplified resist material including a base polymer, an acid generator for generating an acid through irradiation with light and an aromatic compound that does not generate an acid through irradiation with light; irradiating said resist film with extreme UV of a wavelength of a 1 nm through 30 nm band ... ."

In contrast, Hasegawa et al. discloses only that the chemically amplified resist material has a compound capable of suppressing the rate of diffusion when the acid generates within the

resist film. Hasegawa et al. fails to disclose or suggest that the chemically amplified resist material has an aromatic compound that does not generate an acid through irradiation with light. In other words, claim 6 embodies a chemically amplified resist material that has an "aromatic compound that does not generate an acid," whereas Hasegawa et al. discloses only a "compound that suppresses the rate of acid diffusion." Furthermore, Hasegawa et al. additionally fails to disclose or suggest that the compound suppressing the rate of acid diffusion is an aromatic compound. Even further, Hasegawa fails to disclose or suggest "irradiating said resist film with extreme UV of a wavelength of a 1 nm through 30 nm band" for reasons similar to those discussed above with respect to claim 1. Again, "inherency may not be established by probabilities or possibilities", *Scaltech Inc. v. Retec/Tetra,* 178 F.3d 1378 (Fed. Cir. 1999).

As anticipation under 35 U.S.C. § 102 requires that each and every element of the claim be disclosed in a single prior art reference, *Akzo N.V. v. U.S. Int'l Trade Commission,* 808 F.2d 1471 (Fed. Cir. 1986), based on the forgoing, it is submitted that Hasegawa et al. does not anticipate claim 6, nor any claim dependent thereon.

Moreover, according to one aspect of the present invention as recited in claim 6, when the resist film is irradiated with the extreme UV of a wavelength of a 1 nm through 30 nm band for the pattern exposure, although radicals concerned with the crosslinking reaction are generated through the extreme UV irradiation in the exposed portion of the resist film, the radicals can be captured by the aromatic compound, and the captured radicals are not diverted to acid generation. Accordingly, the number of radicals generated from the base polymer and concerned with the crosslinking reaction can be reduced, and hence, the crosslinking reaction is minimally caused and the exposed portion of the resist film can be definitely dissolved in an alkaline developer. As a result, the resist pattern can be formed in a good pattern shape.

In general, regarding both claims 1 and 6 with respect to the irradiation, it is noted that by irradiating the resist film with the extreme UV with high energy, a part of the resist material can be excited. Meanwhile, radicals and the like can be generated from the resist material, and a crosslinking reaction can be accelerated thereby. When the crosslinking reaction progresses within the base polymer and between polymers, the molecular weight of the polymer gets larger. As a result, the problem of the decrease in solubility of the resist film occurs at the developing step. One of the objects of the present invention is to solve such a problem, and thus it is a precondition to irradiate the resist film with the extreme UV of a wavelength of a 1 nm through 30 nm band.

In general, the greater a wavelength of the exposing light is, the lower the light energy becomes, and vice versa. Thus, when the resist film is irradiated with UV of wavelength of 193-248 nm, an excimer laser, x-rays, or an electron beam, the fine resist pattern to be achieved through the present invention cannot be obtained, and the problem to be solved in the present invention will not occur.

Whereas, a wavelength of extreme UV is more than 100 times greater than that of x-rays, and light energy supplied to the resist film irradiated with extreme UV is significantly lower than that irradiated with x-rays. Thus, adequate energy for the radical generation within the resist film cannot be obtained, and the number of radicals generated by excitation of the base polymer is small. As a result, the problem to be solved in the invention occurs.

In the case of irradiating the resist film with the x-rays, since the number of the radicals generated by excitation of the base polymer is large, the problem to be solved in the invention will not occur.

As mentioned above, one object of the present invention is to solve the problem caused by irradiating the resist film with extreme UV of a wavelength of a 1 nm through 30 nm band, and thus the irradiation of the extreme UV is a precondition. Hasegawa et al. is completely silent as to irradiation with extreme UV, and in view of the foregoing, there is no motivation in the prior art to make modifications thereto. Only Applicants have conceived of, and provided the rationale for, the novel combination of elements as recited in the pending claims.

Based on all the foregoing, it is submitted that claims 1-6 are patentable over the cited prior art. Accordingly, it is respectfully requested that the rejection of claims 1-6 under 35 U.S.C. § 102 over Hasegawa et al. be withdrawn.

CONCLUSION

Having fully and completely responded to the Office Action, Applicant submits that all of the claims are now in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicant's attorney at the telephone number shown below. To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,
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